



Standard Tolerances for Yarns Spun on the Cotton or Worsted Systems¹

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1. Scope

1.1 These tolerances are applicable to all yarns spun on the cotton or the worsted system, either carded or combed, and composed of any fiber or mixture of fibers, except cotton tire cords and novelty or fancy yarns.

1.2 These tolerances are applicable only to yarns taken from packages, and not to yarns taken from greige or processed fabrics.

NOTE 1—For tolerances for other spun yarns, see Tolerances D 2644, Methods D 179 and D 738, and Specifications D 541 and D 681.

1.3 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 ASTM Standards:

- D 123 Terminology Relating to Textiles²
- D 179 Methods for Testing Tire Cords and Cord Fabrics Made from Cotton³
- D 541 Specification for Single Jute Yarn²
- D 681 Specification for Jute Rove and Piled Yarn for Electrical and Packing Purposes⁴
- D 738 Methods for Rope Made from Bast and Leaf Fibers⁵
- D 1422 Test Method for Twist in Single Spun Yarns by the Untwist-Retwist Method²
- D 1423 Test Method for Twist in Yarns by the Direct-Counting Method²
- D 1578 Test Method for Breaking Strength of Yarn in Skein Form²
- D 1907 Test Method for Yarn Number by the Skein Method²
- D 2255 Test Method for Grading Spun Yarns for Appearance²
- D 2256 Test Method for Tensile Properties of Yarns by the

Single-Strand Method²

- D 2257 Test Method for Extractable Matter in Textiles²
- D 2258 Practice for Sampling Yarn for Testing²
- D 2494 Test Method for Commercial Mass of a Shipment of Yarn or Man-Made Staple Fiber or Tow²
- D 2644 Tolerances for Yarn Spun on the Woolen System²

3. Terminology

3.1 Definitions:

3.1.1 *cotton system, n*—a spinning system adapted to fibers less than 65 mm (2.5 in.) in length.

3.1.1.1 *Discussion*—This system usually employs flat-top cards and may use roller and other drafting assemblies on intermediate processes and spinning machines.

3.1.2 *tolerances, n*—in mathematics, prescribed limits of variation for specified properties of a particular material based on observed values obtained by specified test methods and on samples that are representative of the material.

3.1.3 *worsted system, n*—a spinning system adapted to fibers 50 to 225 mm (2 to 9 in.) in length.

3.1.3.1 *Discussion*—This system employs roller-top cards, pin drafters, or gills, and widely spaced roller drafting assemblies on roving and spinning frames. Wool yarns spun on the worsted system are usually combed; worsted-spun man-made fiber yarns are not combed.

3.1.4 For definitions of worsted-spun yarns and other terms used in these tolerances, refer to Terminology D 123.

4. Sampling

4.1 Take samples as directed in the applicable material specification, or in the absence of specifications, proceed as directed in Practice D 2258.

5. Tolerances

5.1 *Strength*—The average breaking force of each lot shall be equal to or greater than the specified minimum.

5.2 Yarn Number:

5.2.1 The average yarn number of yarns spun on cotton system or the worsted system shall conform to the limits: specified value \pm 4.0 % of the specified value.

5.3 Twist:

5.3.1 The direction of twist in each package or end shall be S or Z, as specified.

5.3.2 In all cotton-system yarns except single yarns made of cotton, the average twist shall conform to the limits: specified

¹ These tolerances are under the jurisdiction of ASTM Committee D13 on Textiles, and are the direct responsibility of Subcommittee D13.58 on Yarn Test Methods, General.

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² *Annual Book of ASTM Standards*, Vol 07.01.

³ Discontinued, see 1974 *Annual Book of ASTM Standards*, Part 32.

⁴ Discontinued; see 1999 *Annual Book of ASTM Standards*, Vol 07.01.

⁵ Discontinued, see 1971 *Book of ASTM Standards*, Part 25.

value $\pm 5.0\%$ of the specified value. In single cotton yarns, including the single yarn components of plied cotton yarns, the average twist shall conform to the limits: specified value $\pm 10.0\%$ of the specified value. In yarns spun on the worsted system the average twist shall conform to the limits: specified value $\pm 7.5\%$ of the specified value.

5.4 *Extractable Matter*—The average percent extractable matter in yarns spun on the worsted system shall not exceed the following values:

	%
Oil-spun yarns	4.0
Dry-spun yarns	1.75

5.5 *Appearance*—At least 80 % of the specimens examined shall be equal in appearance to the standard for the specified grade. The remaining 20 % shall not fall below the next lower grade.

5.6 *Uniformity*:

5.6.1 *Yarns Spun on the Cotton System*—The coefficients of variation of individual observations shall not exceed the limits in Table 1.

5.6.2 *Yarns Spun on the Worsted System*—The average twist of the package containing the highest average twist shall not be higher than that of the package containing the lowest average twist by more than 15.0 % of the lower average.

5.7 *Commercial Mass*—In the absence of other contractual agreements, the invoice mass, that is the commercial mass as adopted in a specific branch of the textile trade, and as determined by the supplier, shall not exceed the commercial mass as determined by the purchaser, by more than 1 %. In branches of the textile trade which use the net mass as the commercial mass, the latter is subject to the same limitation.

NOTE 2—Particular attention is drawn to the results of an interlaboratory test described in Section 10 of Method D 2494.

6. Test Methods

6.1 *Strength*—Determine the breaking force as directed in

TABLE 1 Coefficients of Variation of Individual Observations^A

	Carded, %	Combed, %
Yarn number	5	4
Breaking force, skein	8	6
Breaking force, single strand	18	16
Twist (direct-counting method)	25	22
Twist (untwist-twist, 12.5 cm (5 in.))	14	12
Twist (untwist-twist, 25.0 cm (10 in.))	12	10

^A Higher coefficients of variation than those listed may indicate either poor control of the manufacturing processes or mixed yarn from two or more production lots.

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Test Method D 1578, or Test Method D 2256, as agreed or specified.

6.2 *Yarn Number*—Determine the yarn number by Test Method D 1907, using Option 1 for cotton system yarns and Option 1, 3, or 6 for worsted-spun yarns, as agreed or specified.

6.3 *Twist*—Determine the twist as directed in Test Method D 1423, or, by agreement (for single yarns only), Test Method D 1422.

6.4 *Extractable Matter*—Determine the percent extractable matter as directed in Test Method D 2257.

6.5 *Yarn Appearance*—Determine the appearance grade of yarns as directed in Test Method D 2255.

6.6 *Mass*—Determine the net mass and, if required, the commercial mass of the shipment as directed in Test Method D 2494.

7. Conformance

7.1 The purchaser and supplier may agree on a procedure to establish conformance, including control charts furnished by the supplier, a sequential-sampling plan, or the double-sampling plan outlined in 7.2.

7.2 In the absence of a control-chart or sequential-sampling plan, proceed as directed in 7.2.1-7.2.3.

7.2.1 If the test results for the lot conform to the tolerances for all characteristics specified in Section 5, consider the lot a valid delivery.

7.2.2 If the test results for one or more characteristics do not conform to the tolerances, take a new laboratory sample from either the original lot sample or a new lot sample. Retest the lot for the characteristic(s) that did not conform to the tolerances in the first test, and average the results of the first and second samples as if the results were from one test of double the original number of specimens. If the new average(s) conform(s) to the specified tolerances, consider the lot a valid delivery.

7.2.3 If the test results obtained as directed in 7.2.2 do not conform to the specified tolerances, consider the lot a nonvalid delivery.

8. Keywords

8.1 appearance; commercial mass; cotton system; extractable matter; strand; tolerance; twist; strength; unevenness; worsted system; yarn; yarn-number